SC Shoreline Change Initiative: Research Priorities and Policy Options for the Future

Engineering Perspectives on Research and Information Needs

presented by

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Dewberry

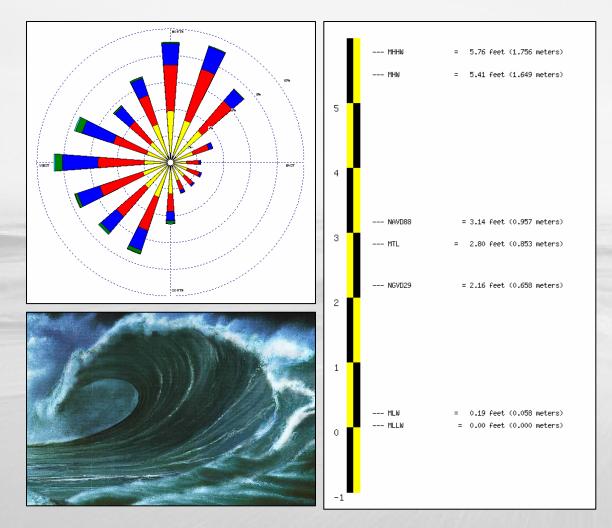
## What is a "Healthy Beach"?

For many Coastal Engineers, a healthy beach:

- o is a wide, sandy beach
- o supports diverse coastal habitats and ecologies
- o provides recreation for people
- o reduces storm damages
- o is allowed to change naturally
- o promotes a broad base of tourism
- o is the cornerstone of thriving coastal economies



....good coastal engineering designs promote "balanced" solutions predicted on good information and research...and systems thinking...



Winds - Waves - Water Levels

#### Research Needs:

- -"Complete" sets of observed gage records are better than theoretical.
- -More wave gages, particularly in nearshore regions.
- -Better desktop models for predictive analyses and designs.
- -Applied is better than theoretical for design.

....what is causing sediment transport and changing/shaping the beach....average and extreme conditions..



#### Research Needs:

- -Systems approach to sediment budgets.
- -Periodic inlet surveys.
- -Beach, inlet, and shoreline management studies and plans.

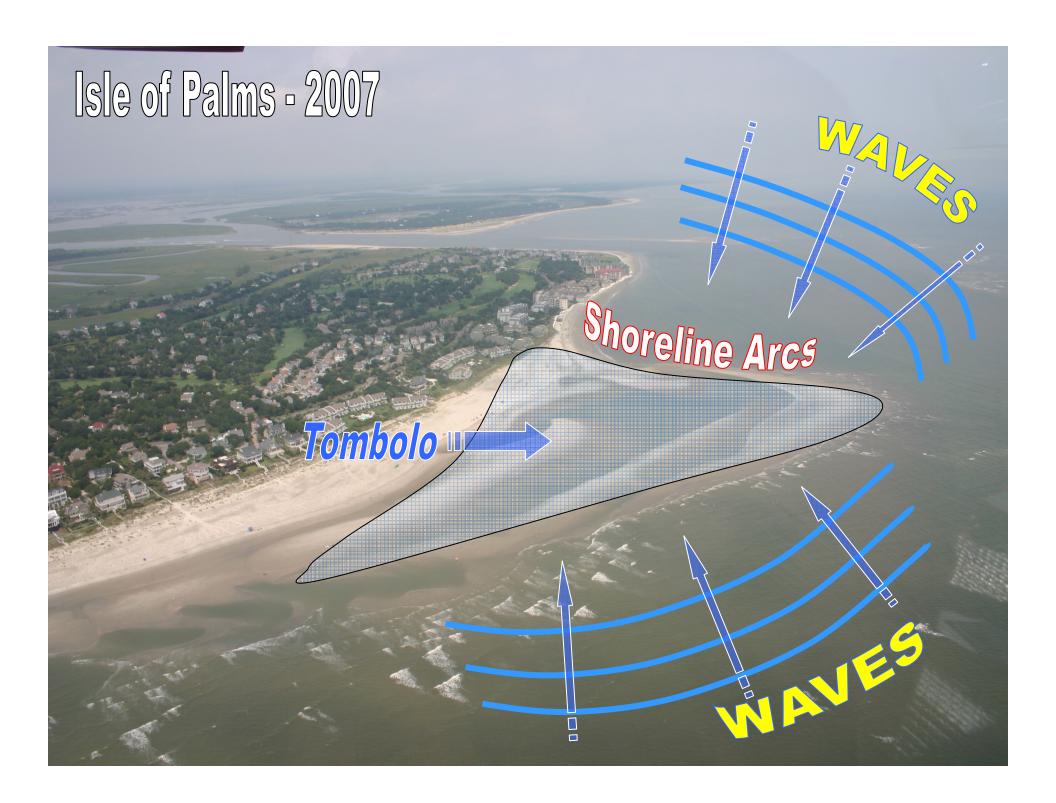
... Where is the sand coming from, where is it going, how long will it take to move from one place (island...inlet...bar) to another, and how much is moving, what are the impacts?..

Shoal Bypassing

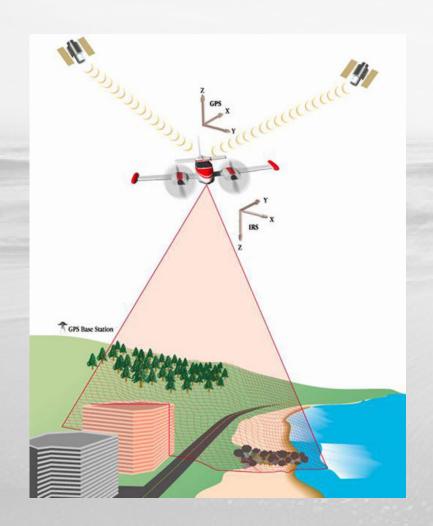


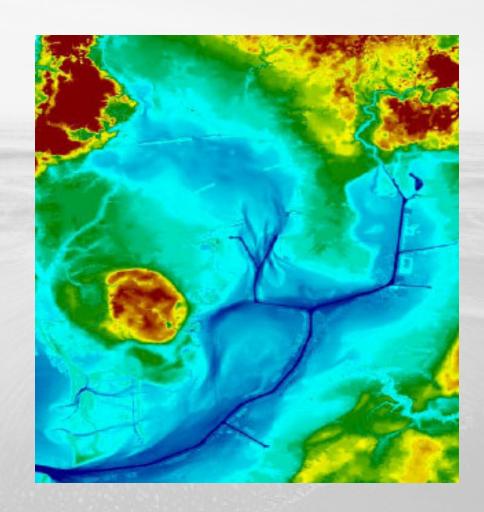
... Decisions must be defended from QUANTITTIVE estimates to be effective and appropriate....

- Research Needs:
- •Annual orthorectified aerial photographs and LIDAR data (joint data collection with multi-agency funding and support).
- Annual or bi-annual aerial photography.
- Doesn't have to be ortho-rectified.
- Provides key insight into large scale system behavior and the forcing-response "signature" of the shoreline.



## LIDAR - DEM





... used in shoreline change analysis, storm surge-wave-sediment transport modeling, hazard mapping/ID, post-storm assessments, and design....

## Develop an active monitoring program

#### **Low Cost Monitoring** (<\$500 if using existing staff resources)

- Annual winter/summer field photographs along the beach
- Field notes of beach, berm, and dune conditions/changes
- Berm widths estimated from walking paces
- Collect a few sediment samples at ~MTL for sieve analysis
- · Cleanliness of the beach, Trash and Pet waste receptacles
- Get GPS coordinates of turtle nest locations and vegetation types

#### Moderate Cost Monitoring (\$1,000 to \$2,000 annually)

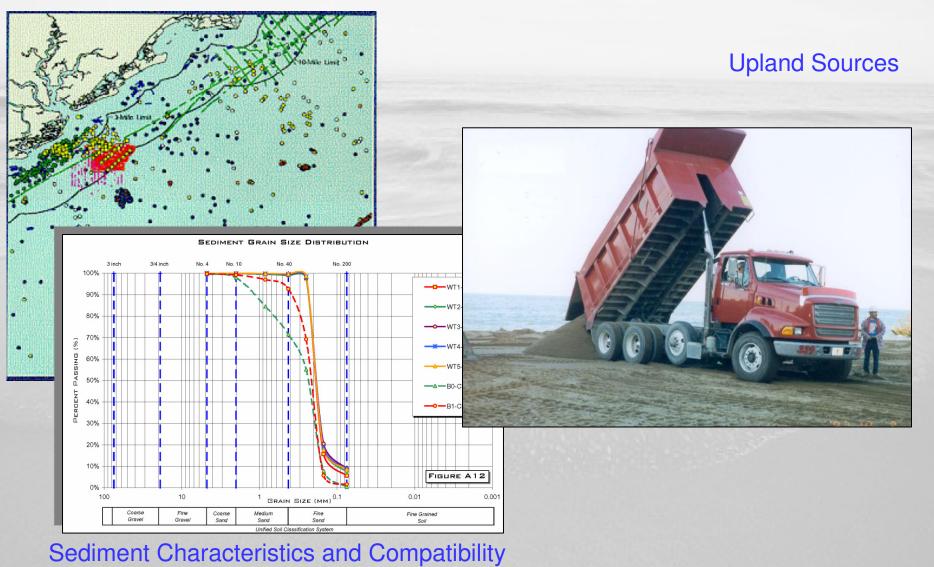
- In addition to Low Cost efforts, add oblique aerial photographs collected coincident with field images.
- Collect more sediment samples at TOD, MHW, MTL, and MLW

#### High Cost Monitoring (\$10,000 to \$50,000 annually)

- In addition to Low & Moderate Cost efforts, add annual geo-rectified aerial photographs.
- Conduct annual beach profile surveys, volume/contour change analysis
- Conduct complete sediment sampling and grain size distribution analysis
- Conduct periodic LIDAR surveys
- Conduct hydrographic surveys of inlet ebb shoals

### Identify Long-term Future Sources of COMPATIBLE Sand

#### **Offshore Sources**



# Document the beach, dune, and back-barrier system ecology.



## Market the Successes of Environmental **Protection Groups**











## seaturtle.org

































Document the impacts and lessons learned of synthetic systems...wherever possible, discard old approaches for new solutions that work with the natural systems to restore or preserve natural features.

Туре	Solution	Short-term Remedy	Long-term	Durability	Environmental Impact	Initial Cost	Annual Maintenance Cost
SOFT	Beach Scraping	Very Limited	Never	1-2 weeks	Macroinvertebrate Species	Low (but accum. \$ high \$)	High
	Small Nourishment	Very Limited	Never	1-2 weeks	Macroinvertebrate Species	Low (but accum. \$ high \$)	High
	Small Sand Bags	Limited	Never	2-4 weeks	Sea Turtles	Low (but accum. \$ high \$)	High
	Large Nourishment	Yes	Yes	5-10 years	First 6 monthslong term recovery very good.	High	Low
HARD	Large Geotextile Systems	Yes	Can be in some situations	1-3 years	Aesthetics Sea Turtles	Moderate	Moderate
	Revetments	Yes	Yes	>25 yrs	Prevents natural retreat	Mod-High	Low-Mod
	Bulkhead	Yes	Yes	25-50 yrs	Prevents natural retreat	High	Mod-High